Achieving Net Zero

Bradley Berneche, President
Alouette Homes

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Canadian Home Builders Association
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Overview

• Who Is Alouette Homes?
• The EQuilibrium™ Initiative
• Alouette’s ÉcoTerra™ House
• Why We Participated
• Some Conclusions
• Question Period
Who is Alouette Homes?

- A manufacturer of modular and panelized housing solutions
- Headquartered in the Eastern Townships area of Quebec, with a second production facility in Virginia

www.alouettehomes.com
Who is Alouette Homes?

- A clientele that ranges from first-time home buyers to buyers of custom, near luxury homes; from direct-to-consumers to large builders and developers.
Modular homes

- Large dimension “boxes”
- An advanced level of prefabrication
- Quickly assembled on site
- Expensive to transport over long distances
- Certain design issues that can add costs
- Markets served: Quebec, Ontario and New England (from the Quebec factory), Virginia, West Virginia, North Carolina and South Carolina (from the Virginia factory)
Panelized Homes

- “Flat-pack” concept
- Assembled on-site
- Inexpensive to transport and virtually no design issues
- Markets served: anywhere in the world, but we are actively developing markets in the United Kingdom and France.
Exports

- Since 1998
- Homes delivered to Chile, Slovakia, Switzerland, Spain, France and the United Kingdom.
What is The EQuilibrium™ Housing Initiative?

• An initiative by CMHC to promote the development, construction and demonstration of net zero energy, healthy homes
• A balanced approach to sustainable residential development
  – The lowest possible net energy usage
  – Affordability
  – Occupant health and comfort
  – Sustainability
The EQuilibrium™ Approach

- An Integrated Design Process
- An intensive, structured and facilitated collaboration between:
  - Architects and engineers
  - Planners and building authorities
  - Major suppliers and contractors
  - Clients and other stakeholders
- Simulation and modelling of various energy strategies
- Cost/benefit evaluations of various solutions
- A period of demonstration
- Ongoing monitoring while occupied
The Principal Elements

- A highly efficient thermal envelope
- Optimisation of passive solar gains
- Various energy recovery strategies
- Integrated renewable energy systems
- Sustainable building practices
- Occupant health and comfort
Thermal Envelope

- High performance envelope
- Thermal bridges eliminated
- Triple glazing

- R-54.2 Ceilings
- R-37.5 Walls
- R-22 Basement Walls
- R-7 Under Slab
- 0.83 AC/H
Passive Solar Optimization

- Open design
- Additional thermal mass
- No cooling required
Energy Recovery

- Heat recovery ventilator with ECM motor, controlled by home automation system
- Drain-water heat recovery
Renewable Energy Sources

• 3 Ton, two-stage, geothermal heat pump
• 3 KW PV array producing 3,420 kWh annually
• Grid connected with net metering
Innovative Features

• Cooling of PV panels / solar thermal “harvesting”
• Integration of various systems through home automation system
Factory Integrated, Modern, Modular Construction Methods

- Six modules, including a technical "pod" in the basement and a PV/Thermal solar roof module
Sustainability

- Wood frame, siding, flooring and cabinetry
- Recycled materials
- Off-site manufactured, modular sections
- More efficient use of materials, extensive recycling
- Environmental covenants at building site
- Self contained water supply and waste water disposal
- Greatly reduced carbon emissions
Healthy House

- Reduced air leakage; balanced, fresh, filtered air to every room
- Uniform temperatures and humidity levels throughout the house
- Natural materials and finishes chosen to minimize indoor air pollution
- Optimization of natural lighting
- Healthy activities just outside the door
Results

- The average house in Quebec consumes approximately 26,000 kWh (with electric heating). Computer modelling indicates that our ÉcoTerra™ house will consume approximately 5,575 kWh.
- Of this amount, PV panels will provide 3,265 kWh, leaving a net energy deficit of approximately 2,310 kWh (Equilibrium contest rules, family of four).
- The home will be displayed until approximately the end of this summer, after which it will be occupied.
- Monitoring will continue for at least one year to determine which energy strategies performed the best, and also to collect data for future modelling and standards development.
Construction costs

• ~ $350,000 (excluding land)
• ~ $230 per square foot
• 90K to 110K over the cost of a conventionally built home
  • $20k - Building envelope
  • $0k - Passive-solar optimization (orientation, design, etc.)
  • $5k - Energy recuperation
  • $5k - Reduced electrical needs (lighting, appliances, phantom loads, etc.)
  • $5k - Reduced hot water consumption
  • $5k - Control the cost of ventilation
  • $60k - Renewable energy (solar PV, solar thermal, geo-thermal, etc.)
Alouette’s Reasons for Participating

- To maintain and reinforce Alouette Home’s leadership position as a builder of energy efficient and sustainable housing
- An exercise in learning; what are the limitations and opportunities of the technologies available?
- An ongoing effort in the development of products and services that are unique in the marketplace
- The opportunities that exist in delivering new technologies in export markets
Contributors and Collaborators

- Canada Mortgage and Housing Corporation
- La Société d’Habitation du Québec
- Natural Resources Canada,
- Hydro Québec
- Architect
  - Masa Noguchi - PhD, Mackintosh School of Architecture, Glasgow, Scotland
- Engineers:
  - Andreas Athienitis – PhD, Eng, Concordia University
  - Claude Agouri – Eng, Airtechni Inc. Montreal, QC
  - Yves Poissant – PhD, NRCan, CEMTC Varennes
- BASF
Visiting Hours

• Saturdays and Sundays from 11:00 to 16:00
• Mondays from 12:00 to 17:00
• Through the end of summer 2008
• Map available on our web site

Thank You!